New Policy

"DEEP" ENERGY EFFICIENCY IMPROVEMENTS FOR BUILDINGS

Policy summary: To reach our 2050 GHG reduction requirement, energy use in existing buildings must fall dramatically. To accomplish this, it is necessary to begin retrofitting buildings with much higher levels of insulation, less air leakage, and better windows than are typically installed in the retrofit energy efficiency programs. This policy would make rebates and appropriate training and technical support widely available for "deeper" energy improvements for residential buildings

Economy-wide GHG emissions reduced in 2020	0.1 - 0.2 million metric tons; 0.1%-0.2%
Total Fuel Savings in 2020 (MMBtu)	2.7 million
Total Electricity Savings in 2020 (MWh)	79,000
Energy cost savings in 2020	$84 million

Note: energy savings are for the "high" case, with 0.2 million metric tons of CO_2 reductions.

Clean energy economy impacts: Deep retrofits will save large amounts of both electricity and heating fuels, reducing living costs and cutting energy imports; while expanding job opportunities for skilled contractors and construction workers.

Rationale: At present the energy efficiency program administrator (PA)-operated programs provide financial incentives for "moderate" retrofits of residential buildings, such as adding insulation to attics and walls, upgrading fossil-fuel-based heating and cooling equipment, and air sealing. If all the standard measures are done, these improvements typically achieve 20 percent to 30 percent reductions in heating energy use. While a major contributor to our 2020 emissions target, this level of savings is far from adequate for achieving the 2050 requirement of an 80 percent emissions reduction. For 2050 "deeper" measures are needed –higher and more consistent levels of insulation on all the outside surfaces of a building, along with sharp reductions in air leakage. When needed building maintenance is done without adding insulation, such as re-roofing and re-siding, there is a huge "lost opportunity" for achieving energy savings. The PAs currently have pilots that provide incentives for such deep retrofits. This policy would make such incentives a standard part of the PA offerings, with the expectation that their adoption by consumers would gradually rise from now through 2020.

Design issues: Until recently the utilities' pilot only provided incentives for whole-house deep retrofits. The cost of such retrofits is quite high, for both the homeowner and the utilities, and is unlikely to be done broadly. More attractive to homeowners may be "partial" deep retrofits, where one part of a house is done at a time when the owner was planning to do a renovation anyway. The incremental cost of energy saving improvements is greatly reduced when they are integrated with other work on the same portion of a home, such as when replacing a roof, residing exterior walls, or replacing windows. This policy would provide rebates that are substantial enough to attract widespread adoption of deep retrofits, such as rigid insulation installed below the roofing shingles or inside new siding, and triple-pane windows.

Another design option is to continue what some PA deep retrofit pilots are doing currently, paying higher incentives for comprehensive projects that go deeper still, to Net Zero Energy, Passive House and Thousand Homes Challenge levels. Once heating needs are reduced to this level, there are significant savings on heating and cooling equipment. This practice provides additional

leveraging and measure bundling advantages, and builds the skills needed to reach the 2050 GHG reduction requirement.

In addition, the particular methods that are used to evaluate programs for cost effectiveness should be reviewed to ensure that deep retrofits can be implemented to the maximum possible extent.

GHG impact: 0.1 to 0.2 million tons in 2020, depending on the rate of adoption by consumers. The state's consultants have projected a relatively small number of project completions, based on (a) homeowners only undertake deep retrofits at the time when they are doing building maintenance anyway, (b) consumer adoption begins at low levels and grows slowly until it reaches 10 percent of normal maintenance projects by 2020. Since these are long-lasting improvements to buildings the cumulative impacts continue growing beyond 2020, contributing substantially to the 2050 reduction requirement.

Other benefits: Substantial reductions in energy use, cost savings to homeowner, and improvements to building comfort.

Costs: Costs to the utility efficiency budgets and to homeowners are significant. For an expanded program that goes beyond the current pilots, impacts on utility budgets would depend on the scale of adoption by consumers.

Equity issues: In most cases the incentives for deep retrofits will be substantially larger than those offered for "moderate" retrofits. This creates possible equity issues between participants and non-participants in the program.

Experience in other states: The pilots currently underway by Massachusetts utilities are at the forefront of deep retrofit efforts in the United States. California has made a commitment to achieving sharp reductions in energy use by existing buildings, and the Province of Yukon in Canada has a program to super-insulate existing buildings.

Legal authority: These kinds of programs fall within the authority of the electric and gas utilities under their existing efficiency programs.

Implementation issues: Deep retrofits involve more complex construction techniques than are needed for conventional construction or moderate retrofits. To achieve the projected energy savings, and to not create or worsen other problems such as moisture and mold issues in a home, the deep retrofit shell must be installed correctly. As less heat is used in a building the drying potential is greatly reduced, so both interior and exterior water management details become critical for the health of occupants and durability of the structure. To avoid other indoor air quality problems, as well as to capitalize on smaller heating loads, shell measures should be carefully integrated with mechanical ventilation and smaller heating equipment that has sealed combustion or forced draft. Further, deep measures, if installed incrementally, should be deployed in a manner that does not hamper future energy improvements. This requires contractors with appropriate deep retrofit expertise, partnered with others with advanced HVAC expertise. At present these skills\teams are in limited supply and there is a need for training of contractors, along with a contractor guidance and inspection component such as in the Energy Star Homes program. Also needed is a system or incentives for a party involved to have long-term responsibility for the energy performance, durability, health, and safety of buildings that undergo deep retrofits.

Uncertainty: The rate of adoption of deep retrofits by consumers, even with substantial utility incentives, is not known and could be lower than projected. Availability of sufficient funds, from utility budgets or other sources, could be a question if the rate of adoption is high.